

Supply Chain Management

Prepared by Dr. Tarek Mohamed

MGM 660

Lecture Four



Designing distribution networks in the Supply Chain

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www.midocean.ae

Learning Objectives

- 1- Identify the key factors to be considered when designing a distribution network.**
- 2- Discuss the strengths and weaknesses of various distribution options.**
- 3- Understand how e-business have affected the design of distribution networks in different industries.**



The Role of Distribution in the Supply Chain

- **Distribution** – the steps taken to move and store a product from the supplier stage to the customer stage in a supply chain
- **Distribution-** is a key driver of the overall profitability of a firm because it affects both the supply chain cost and the customer value directly
- Choice of distribution network can achieve supply chain objectives from low cost to high responsiveness
- In the apparel retail industry, for example, distribution affects about 35 percent of the revenue (including its influence on markdowns and lost sales).

The Role of Distribution in the Supply Chain

- Until 2007, **Dell** distributed its PCs directly to end consumers, whereas companies such as **HP** distributed through resellers.
- Dell customers waited several days to get a PC, whereas customers could walk away with an **HP** computer from a reseller.
- Starting in June 2007, Dell also started selling its PCs through retailers such as Walmart.
- In the late 1990s, **Gateway** opened Gateway Country stores, wherein customers could examine the products and have salespeople help them configure a PC that suited their needs. Gateway, however, chose to sell no products at the stores; all PCs were shipped directly from the factory to the customer.

Factors Influencing Distribution Network Design

- Distribution network performance evaluated along two dimensions
 1. Customer needs that are met
 2. Cost of meeting customer needs
- Evaluate the impact on customer service and cost for different distribution network options
- Profitability of the delivery network determined by revenue from met customer needs and network costs
- Inbound transportation costs are costs incurred in bringing material into a facility
- Outbound transportation costs are costs incurred in sending material out of a facility

Factors Influencing Distribution Network Design

- **Elements of customer service influenced by network structure:**
 - Response time
 - Product variety
 - Product availability
 - Customer experience
 - Order visibility
 - Returnability

Factors Influencing Distribution Network Design

- **Supply chain costs affected by network structure:**
 - Inventories
 - Transportation
 - Facilities and handling
 - Information
- ❑ The choice of the distribution network can be used to achieve supply chain objectives such as low cost and high responsiveness
- ❑ Total logistics costs for a supply chain network are a sum of inventory, transportation, and facility costs

Design Options for a Distribution Network

- **Distribution network choices from the manufacturer to the end consumer**
- **Two key decisions**
 1. Will product be delivered to the customer location or picked up from a prearranged site?
 2. Will product flow through an intermediary (or intermediate location)?

Design Options for a Distribution Network

- **One of six designs may be used**
 1. Manufacturer storage with direct shipping
 2. Manufacturer storage with direct shipping and in-transit merge
 3. Distributor storage with carrier delivery
 4. Distributor storage with last-mile delivery
 5. Manufacturer/distributor storage with customer pickup
 6. Retail storage with customer pickup

Manufacturer Storage with Direct Shipping Network

Cost Factor	Performance
Inventory	Lower costs because of aggregation. Benefits of aggregation are highest for low-demand, high-value items. Benefits are large if product customization can be postponed at the manufacturer.
Transportation	Higher transportation costs because of increased distance and disaggregate shipping.
Facilities and handling	Lower facility costs because of aggregation. Some saving on handling costs if manufacturer can manage small shipments or ship from production line.
Information	Significant investment in information infrastructure to integrate manufacturer and retailer.

Manufacturer Storage with Direct Shipping Network

Service Factor	Performance
Response time	Long response time of one to two weeks because of increased distance and two stages for order processing. Response time may vary by product, thus complicating receiving.
Product variety	Easy to provide a high level of variety.
Product availability	Easy to provide a high level of product availability because of aggregation at manufacturer.
Customer experience	Good in terms of home delivery but can suffer if order from several manufacturers is sent as partial shipments.
Time to market	Fast, with the product available as soon as the first unit is produced.
Order visibility	More difficult but also more important from a customer service perspective.
Returnability	Expensive and difficult to implement.

In-Transit Merge

Cost Factor

Performance

Inventory

Similar to drop-shipping.

Transportation

Somewhat lower transportation costs than drop-shipping.

Facilities and handling

Handling costs higher than drop-shipping at carrier; receiving costs lower at customer.

Information

Investment is somewhat higher than for drop-shipping.

In-Transit Merge

Service Factor	Performance
Response time	Similar to drop-shipping; may be marginally higher.
Product variety	Similar to drop-shipping.
Product availability	Similar to drop-shipping.
Customer experience	Better than drop-shipping because only a single delivery has to be received.
Time to market	Similar to drop-shipping.
Order visibility	Similar to drop-shipping.
Returnability	Similar to drop-shipping.

Distributor Storage with Carrier Delivery

Cost Factor

Performance

Inventory

Higher than manufacturer storage. Difference is not large for faster moving items but can be large for very slow-moving items.

Transportation

Lower than manufacturer storage. Reduction is highest for faster moving items.

Facilities and handling

Somewhat higher than manufacturer storage. The difference can be large for very slow-moving items.

Information

Simpler infrastructure compared to manufacturer storage.

Distributor Storage with Carrier Delivery

Service Factor	Performance
Response time	Faster than manufacturer storage.
Product variety	Lower than manufacturer storage.
Product availability	Higher cost to provide the same level of availability as manufacturer storage.
Customer experience	Better than manufacturer storage with drop-shipping.
Time to market	Higher than manufacturer storage.
Order visibility	Easier than manufacturer storage.
Returnability	Easier than manufacturer storage.

Distributor Storage with Last Mile Delivery

Cost Factor	Performance
Inventory	Higher than distributor storage with package carrier delivery.
Transportation	Very high cost given minimal scale economies. Higher than any other distribution option.
Facilities and handling	Facility costs higher than manufacturer storage or distributor storage with package carrier delivery, but lower than a chain of retail stores.
Information	Similar to distributor storage with package carrier delivery.

Distributor Storage with Last Mile Delivery

Service Factor	Performance
Response time	Very quick. Same day to next-day delivery.
Product variety	Somewhat less than distributor storage with package carrier delivery but larger than retail stores.
Product availability	More expensive to provide availability than any other option except retail stores.
Customer experience	Very good, particularly for bulky items. Slightly higher than distributor storage with package carrier delivery.
Time to market	Less of an issue and easier to implement than manufacturer storage or distributor storage with package carrier delivery.
Order visibility	Easier to implement than other previous options.
Returnability	Harder and more expensive than a retail network.

Manufacturer or Distributor Storage with Customer Pickup

Cost Factor	Performance
Inventory	Can match any other option, depending on the location of inventory.
Transportation	Lower than the use of package carriers, especially if using an existing delivery network.
Facilities and handling	Facility costs can be high if new facilities have to be built. Costs are lower if existing facilities are used. The increase in handling cost at the pickup site can be significant.
Information	Significant investment in infrastructure required.

Manufacturer or Distributor Storage with Customer Pickup

Service Factor	Performance
Response time	Similar to package carrier delivery with manufacturer or distributor storage. Same-day delivery possible for items stored locally at pickup site.
Product variety	Similar to other manufacturer or distributor storage options.
Product availability	Similar to other manufacturer or distributor storage options.
Customer experience	Lower than other options because of the lack of home delivery. Experience is sensitive to capability of pickup location.
Time to market	Similar to manufacturer storage options.
Order visibility	Difficult but essential.
Returnability	Somewhat easier given that pickup location can handle returns.

Retail Storage with Customer Pickup

Cost Factor	Performance
Inventory	Higher than all other options.
Transportation	Lower than all other options.
Facilities and handling	Higher than other options. The increase in handling cost at the pickup site can be significant for online and phone orders.
Information	Some investment in infrastructure required for online and phone orders.

Retail Storage with Customer Pickup

Service Factor	Performance
Response time	Same-day (immediate) pickup possible for items stored locally at pickup site.
Product variety	Lower than all other options.
Product availability	More expensive to provide than all other options.
Customer experience	Related to whether shopping is viewed as a positive or negative experience by customer.
Time to market	Highest among distribution options.
Order visibility	Trivial for in-store orders. Difficult, but essential, for online and phone orders.
Returnability	Easier than other options because retail store can provide a substitute.

Impact of Online Sales on Customer Service

- **Response time to customers**
 - Physical products take longer to fulfill than retail store
 - No delay for information goods
- **Product variety**
 - Easier to offer larger selection
- **Product availability**
 - Aggregating inventory and better information on customer preferences improves product availability

Impact of Online Sales on Customer Service

- **Customer experience**
 - Improved access, customization, and convenience
- **Faster time to market**
- **Order Visibility**
- **Returnability**
 - Harder with online orders
 - Proportion of returns likely to be much higher

Impact of Online Sales on Customer Service

- **Direct Sales to Customers**

Social networking channels allow firms to directly pitch products and promotion

- **Flexible Pricing, Product Portfolio, and Promotions**

Manage revenues from product portfolio more effectively than traditional channels

Promotion information can be conveyed to customers quickly and inexpensively

- **Efficient Funds Transfer**

Impact of Online Sales on Cost

Inventory

- Lower inventory levels if customers will wait
- Postpone variety until after the customer order is received

Facilities

- Costs related to the number and location of facilities in a network
- Costs associated with the operations in these facilities

Transportation

- Lower cost of “transporting” information goods in digital form
- For nondigital, aggregating inventories increases outbound transportation

Information

- Share demand, planning, and forecasting information throughout its supply chain
- Additional costs to build and maintain the information infrastructure

Using Online Sales to Sell Computer Hardware: Dell

☐ **Impact of online sales on customer service**

- Delay in fulfilling customer request

☐ **Impact of online sales on cost**

- Reduced inventory costs
- Lower facility costs
- Higher total transportation costs
- Incremental increase in information costs

Using Online Sales to Sell Computer Hardware: Dell

- ❑ **A tailored supply chain network to sell computer hardware for Dell includes :**
 - A hybrid model can be very effective
 - More significant as hardware becomes more of a commodity
 - Take advantage of the strengths of both online sales and traditional retail and distribution channels

Using Online Sales to Sell Books: Amazon

- **Impact of online sales on customer service**
 - Internet has not shortened supply chains
 - Increased selection, convenience
- **Impact of online sales on cost**
 - Reduced inventory costs
 - Lower facility costs
 - Higher total transportation costs
 - Increase in information costs
- **A supply chain network for books**
 - Traditional bookstores pressured from both ends
 - Amazon more efficient

Using the Internet to Sell Groceries: Peapod

- **Impact of online sales on customer service**
 - Sell convenience and the time savings
 - Offers less variety
 - Creating a personalized shopping experience and customized advertising and promotions
- **Impact of online sales on cost**
 - Reduced inventory costs
 - Higher facility costs due to picking operation
 - Significantly higher total transportation costs
 - Increase in information costs

Using the Internet to Sell Groceries: Peapod

- **Value of online sales to a traditional grocery chain**
 - Complement the strengths of their existing network
 - Offer an entire array of services at differing prices based on the amount of work the customer does

Using the Internet to Rent Movies: Netflix

- **Impact of online sales on customer service**
 - Staggering selection and an excellent recommendation engine
 - Video streaming through a variety of devices
 - Customers received their DVDs within 24 hours of being shipped
- **Impact of online sales on cost**
 - Reduced inventory costs
 - Lower facility costs
 - Considerably higher total transportation costs, increased streaming will reduce transportation costs
 - Increase in information costs

Distribution Networks in Practice

- ☐ The ownership structure of the distribution network can have as big an impact as the type of distribution network
- ☐ It is important to have adaptable distribution networks
- ☐ Product price, commoditization, and criticality affect the type of distribution system preferred by customers

Distribution Networks in Practice

- ☐ Integrate the Internet with the existing physical network
- ☐ Consider whether an exclusive distribution strategy is advantageous

Summary of Learning Objectives

- 1- Identify the key factors to be considered when designing a distribution network.
- 2- Discuss the strengths and weaknesses of various distribution options.
- 3- Understand how e-business have affected the design of distribution networks in different industries.

Essential Reference

Chopra, S., & Meindl, P. (2016). Global Edition. Pearson Education Limited

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